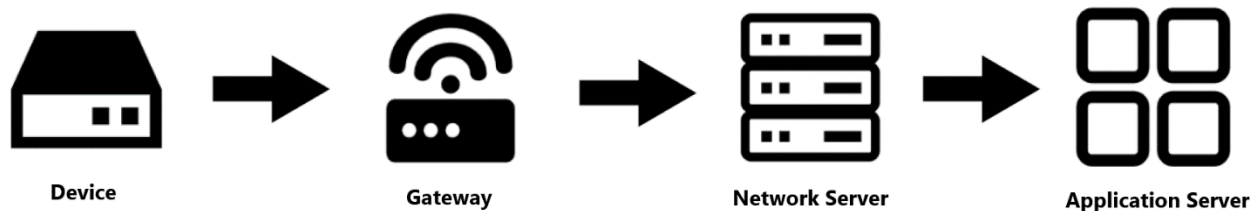


1. Overview

This document introduces how to connect a Lansitec end device to Chirpstack v4.0.0. Please refer to Chapter **2 Install ChirpStack Network Server**. Lansitec LoRaWAN device architecture consists of a node, gateway, network server, and application server. The architecture is as follows.



2. Install ChirpStack Network Server

2.1 Install Docker

You can refer to the official Docker document ([Get Docker | Docker Docs](#)), which provides detailed installation instructions for various devices.

- Here, we provide another method for installing the Docker, which uses the apt command.

```
sudo apt update
```

```
sudo apt install docker.io
```

```
sudo apt install docker-compose
```

- Execute the following command upon installation:

```
sudo docker -v
```

Check the Docker version

```
sudo docker run hello-world
```

To verify if the Docker service is active

```
root@su:~# sudo docker run hello-world
Unable to find image 'hello-world:latest' locally
latest: Pulling from library/hello-world
c1ec31eb5944: Pull complete
Digest: sha256:1408fec50309afee38f3535383f5b09419e6dc0925bc69891e79d84cc4cdcec6
Status: Downloaded newer image for hello-world:latest
```

Hello from Docker!

This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:

1. The Docker client contacted the Docker daemon.
2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
(amd64)
3. The Docker daemon created a new container from that image which runs the executable that produces the output you are currently reading.
4. The Docker daemon streamed that output to the Docker client, which sent it to your terminal.

To try something more ambitious, you can run an Ubuntu container with:

```
$ docker run -it ubuntu bash
```

Share images, automate workflows, and more with a free Docker ID:

<https://hub.docker.com/>

For more examples and ideas, visit:

<https://docs.docker.com/get-started/>

- The page above indicates the installation is done successfully.

2.2 Install ChirpStack

2.2.1 Clone example repository

For more information about ChirpStack network server, please refer to [Introduction - ChirpStack open-source LoRaWAN® Network Server documentation](#).

ChirpStack website offers many different installation methods. Here, we provide the most convenient and universal method for deploying Docker.

- To clone this repository, you can use the following command:

```
git clone https://github.com/chirpstack/chirpstack-docker.git
```

```
root@su:~# git clone https://github.com/chirpstack/chirpstack-docker.git
Cloning into 'chirpstack-docker'...
remote: Enumerating objects: 551, done.
remote: Counting objects: 100% (547/547), done.
remote: Compressing objects: 100% (192/192), done.
remote: Total 551 (delta 384), reused 452 (delta 335), pack-reused 4
Receiving objects: 100% (551/551), 94.30 KiB | 502.00 KiB/s, done.
Resolving deltas: 100% (384/384), done.
```

- After a successful download, open the folder, and you should see the following output:

```
cd chirpstack-docker
```

```
root@su:~# cd chirpstack-docker/
root@su:~/chirpstack-docker# ls
configuration  docker-compose.yml  LICENSE  Makefile  README.md
```

2.2.2 Modify the configuration file

In ./docker-compose.yml

```
chirpstack-gateway-bridge:
  image: chirpstack/chirpstack-gateway-bridge:4
  restart: unless-stopped
  ports:
    - 1700:1700/udp
  volumes:
    - ./configuration/chirpstack-gateway-bridge:/etc/chirpstack-gateway-bridge
  environment:
    - INTEGRATION__MQTT__EVENT_TOPIC_TEMPLATE=eu868/gateway/{{ .GatewayID }}/event/{{ .EventType }}
    - INTEGRATION__MQTT__STATE_TOPIC_TEMPLATE=eu868/gateway/{{ .GatewayID }}/state/{{ .StateType }}
    - INTEGRATION__MQTT__COMMAND_TOPIC_TEMPLATE=eu868/gateway/{{ .GatewayID }}/command/#
  depends_on:
    - mosquito
```

- Change the content marked in the red to the LoRaWAN regional parameter you need.

In `./configuration/chirpstack/chirpstack.toml`

```
# Enabled regions.
#
# Multiple regions can be enabled simultaneously. Each region must match
# the 'name' parameter of the region configuration in '[[regions]]'.
enabled_regions=[
  "as923",
  "as923_2",
  "as923_3",
  "as923_4",
  "au915_0",
  "cn470_10",
  "cn779",
  "eu433",
  "eu868",
  "in865",
  "ism2400",
  "kr920",
  "ru864",
  "us915_0",
  "us915_1",
]
```

- If the LoRaWAN regional parameter you need is not included, you'll need to add it manually. Find the code section shown above and add your region to the line starts with `enabled_regions=[`.

2.3 Run the Chirpstack server

- In your download folder. Run chirpstack.

```
sudo docker-compose up
```

- Background run chirpstack server.

```
sudo docker-compose up -d
```

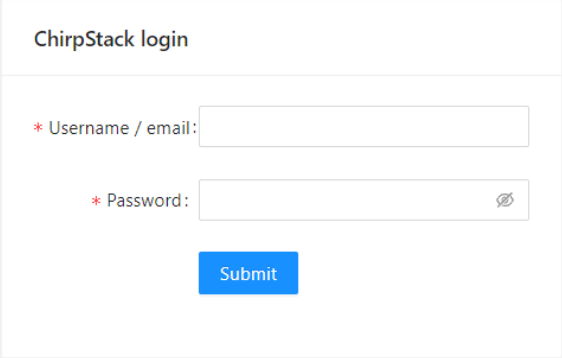
```
root@izuf69usomih0ulzdm0pez:~/chirpstack-docker# sudo docker-compose up -d
Starting chirpstack-docker_chirpstack-application-server_1 ... done
Starting chirpstack-docker_chirpstack-gateway-bridge_1    ... done
Starting chirpstack-docker_redis_1                        ... done
Starting chirpstack-docker_chirpstack-geolocation-server_1 ... done
Starting chirpstack-docker_chirpstack-network-server_1   ... done
Starting chirpstack-docker_mosquitto_1                   ... done
Starting chirpstack-docker_postgresql_1                  ... done
```

- Disable the chirpstack service.

```
sudo docker-compose down
```

2.4 Log in to the Chirpstack server

- Open your browser and visit the website, <http://<Server IP address>:8080>
Username: admin
Password: admin



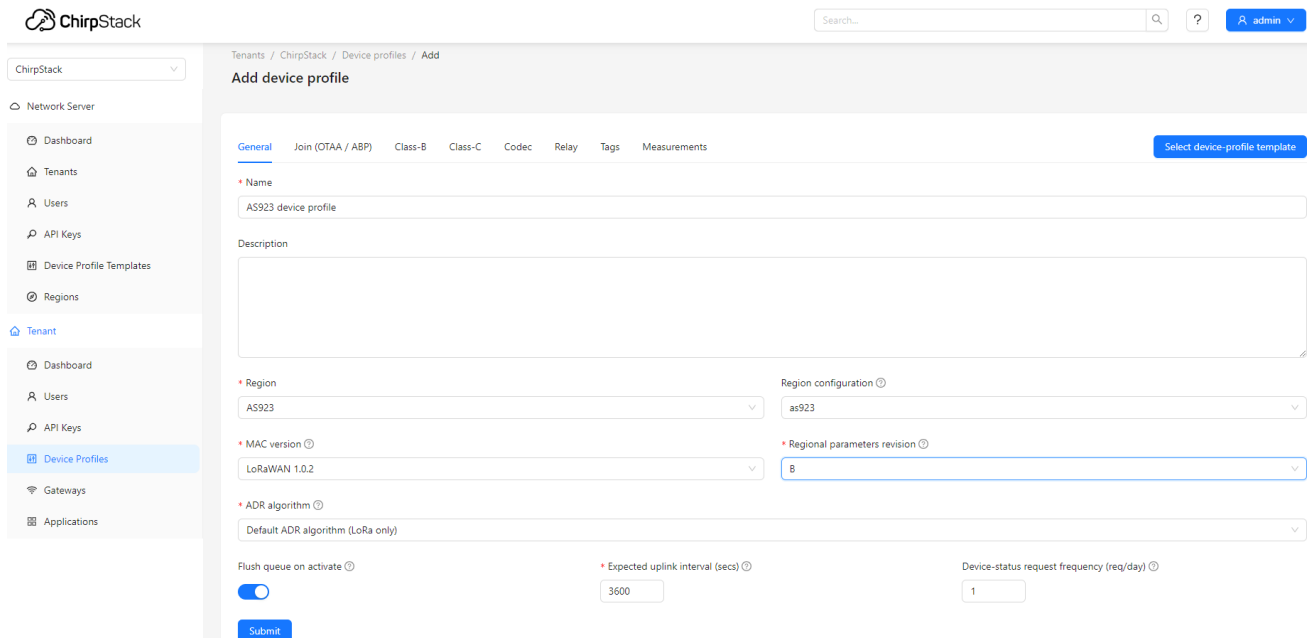
The image shows a screenshot of the ChirpStack login interface. It features a white login box centered on a light gray background. The box is titled "ChirpStack login". Below the title, there are two input fields: the first is labeled "* Username / email:" and the second is labeled "* Password:". The password field includes a small eye icon for toggling visibility. A blue "Submit" button is positioned below the password field.

3. Connect the LoRa Gateway to Chirpstack

3.1 Configure ChirpStack

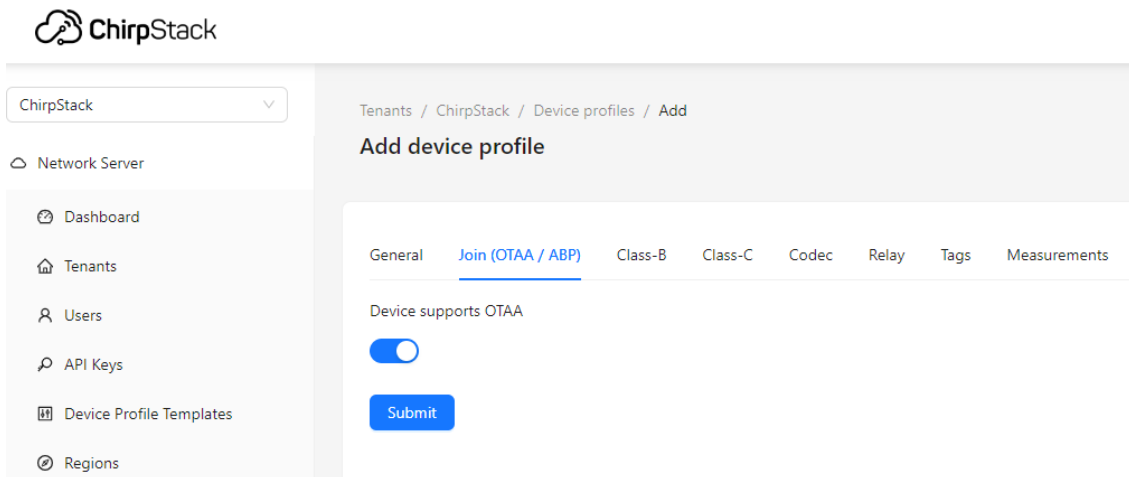
3.1.1 Add Device-profiles*

- Fill in **your device profile name** to *Name
- Select your ***Region** and ***Region configuration**
- Select **LoRAWAN 1.0.2** from *MAC version
- Select **B** from *Regional parameters revision
- Select **Default ADR algorithm (LoRa only)** from *ADR algorithm



The screenshot shows the ChirpStack Admin interface for adding a new device profile. The left sidebar contains navigation links for Network Server, Tenant, and various management tools. The main content area is titled 'Add device profile' and includes tabs for General, Join (OTAA / ABP), Class-B, Class-C, Codec, Relay, Tags, and Measurements. The 'General' tab is active, showing fields for Name (AS923 device profile), Description, Region (AS923), Region configuration (as923), MAC version (LoRaWAN 1.0.2), Regional parameters revision (B), and ADR algorithm (Default ADR algorithm (LoRa only)). There are also checkboxes for 'Flush queue on activate' and 'Expected uplink interval (secs)' (3600), and a 'Device-status request frequency (req/day)' (1). A 'Submit' button is at the bottom.

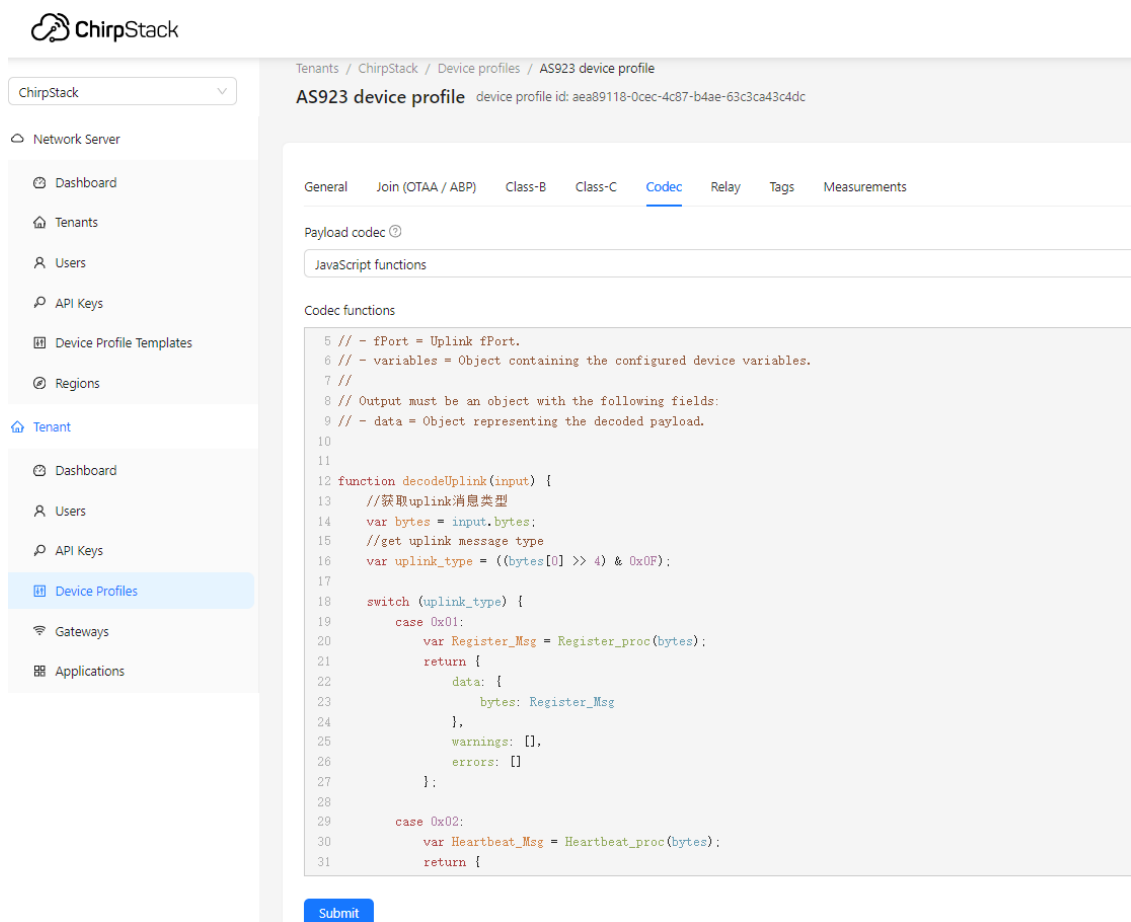
- Join (OTAA/ABP) ----> check *Device supports OTAA



The screenshot shows the ChirpStack Admin interface with the 'Join (OTAA / ABP)' tab selected. The 'Device supports OTAA' checkbox is checked, and a 'Submit' button is visible at the bottom.

3.1.2 Add Decoder File

- Click **CodeC** on the AS923 device profile page
- Select **JavaScript functions** from the Payload codec
- Contact Lansitec staff and get the credentials to log in and find the payload decoder on the DownloadCenter: <https://www.lansitec.com/download/DownloadCentre.html>, and paste the decoder file content into the Codec functions column

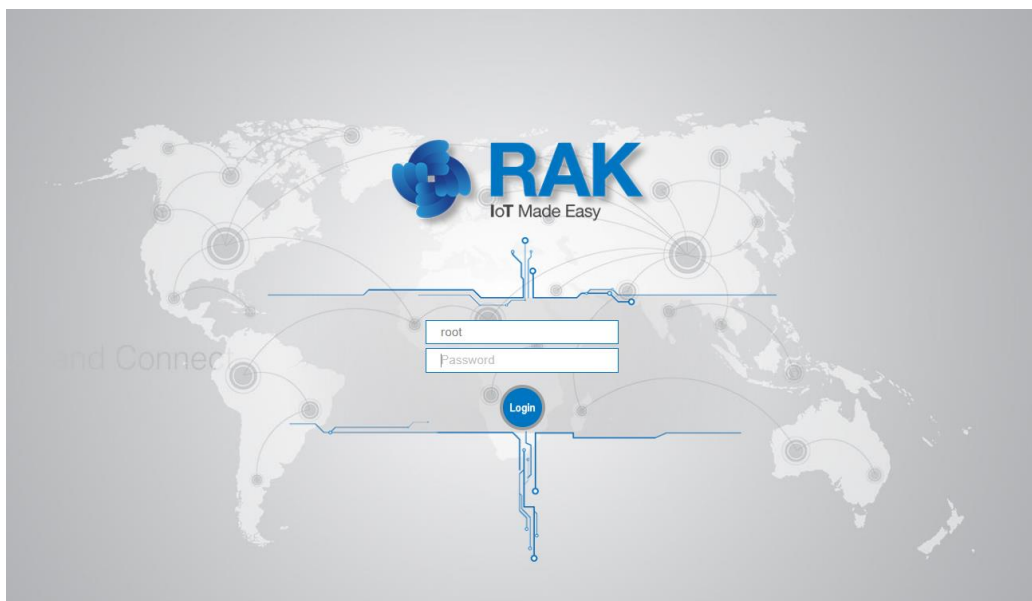


3.2 Configure Gateway

3.2.1 Log in RAK Gateway configuration UI

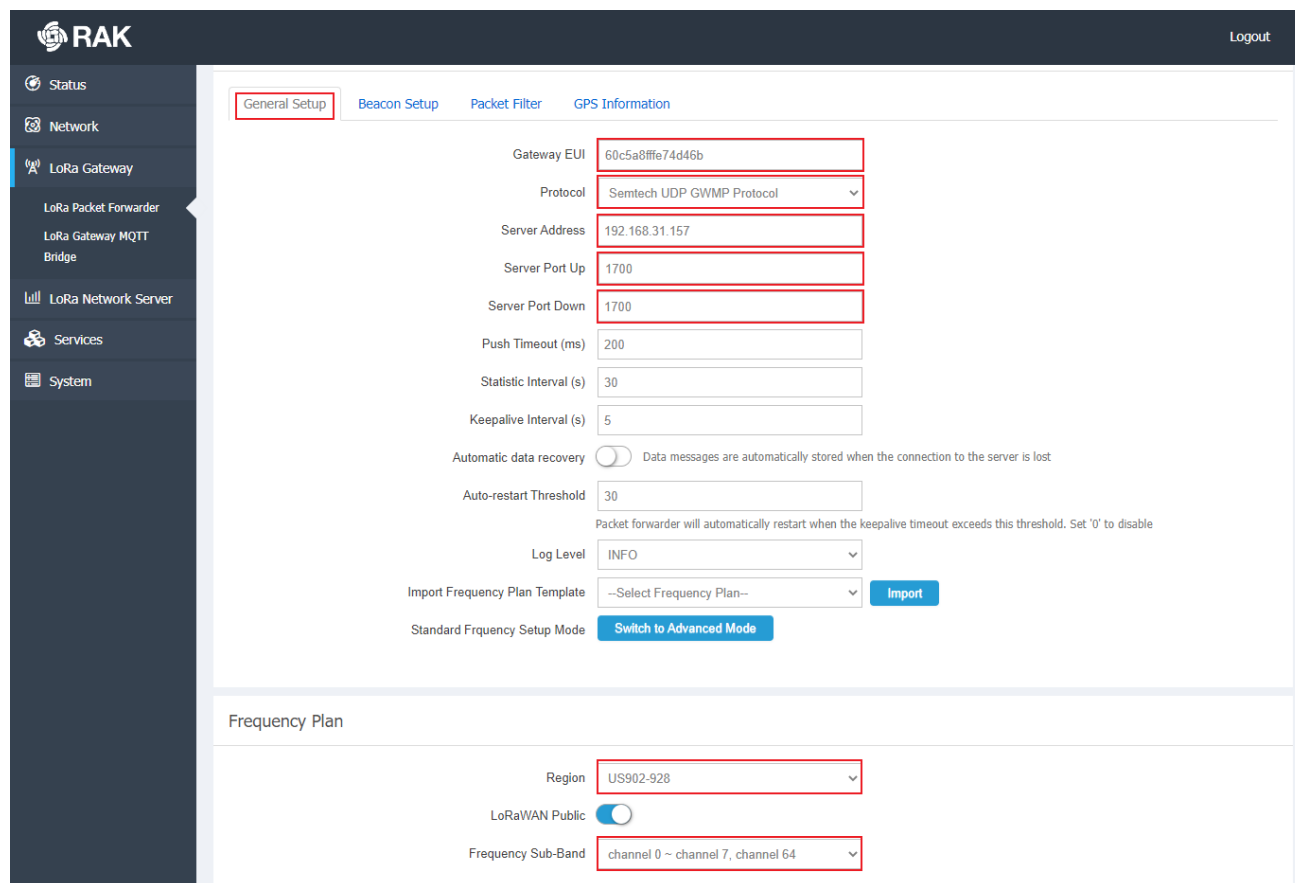
Username: root

Password: root



3.2.2 Configure LoRa Packet Forwarder*

- Copy Gateway EUI for **Section 3.2.3 to use**
- Select **Semtech UDP GWMP Protocol** from 'Protocol'
- Fill in **your ChirpStack server IP address (e.g., 192.168.11.1)** to 'Server Address'
- Fill in **the uplink port and the downlink port you just configured** to 'Server Port'
- Select **the frequency band you used (e.g., US905-928)** from 'Region'
- Select **the frequency channels you used (e.g., channel 0~channel 7, channel 64)** from 'Sub-Band'
- Save&Apply and Reboot gateway



RAK Logout

General Setup Beacon Setup Packet Filter GPS Information

Gateway EUI: 60c5a8ffe74d46b

Protocol: Semtech UDP GWMP Protocol

Server Address: 192.168.31.157

Server Port Up: 1700

Server Port Down: 1700

Push Timeout (ms): 200

Statistic Interval (s): 30

Keepalive Interval (s): 5

Automatic data recovery: ☐ Data messages are automatically stored when the connection to the server is lost

Auto-restart Threshold: 30
Packet forwarder will automatically restart when the keepalive timeout exceeds this threshold. Set '0' to disable

Log Level: INFO

Import Frequency Plan Template: --Select Frequency Plan-- Import

Standard Frequency Setup Mode: Switch to Advanced Mode

Frequency Plan

Region: US902-928

LoRaWAN Public: ☒

Frequency Sub-Band: channel 0 ~ channel 7, channel 64

3.2.3 Add Gateway to ChirpStack

- Fill in **your gateway name(e.g., RAK)** to *Name
- Fill in **your Gateway EUI you just got in Section 3.2.2** to *GatewayID

ChirpStack

Search...

ChirpStack

Network Server

Dashboard

Tenants

Users

API Keys

Device Profile Templates

Regions

Tenant

Dashboard

Users

API Keys

Device Profiles

Gateways

Applications

Tenants / ChirpStack / Gateways / Add

Add gateway

General

Tags

Metadata

* Name

RAK

Description

* Gateway ID (EUI64)

60c5a8fffe74d46b

MSB

* Stats interval (secs)

30

Location

+

-

3.3 Gateway Connected

ChirpStack

Network Server

Dashboard

Tenants

Users

API keys

Device-profile templates

Tenant

Dashboard

Users

Tenants / ChirpStack / Gateways

Gateways

Add gateway

Last seen	Gateway ID	Name	Region name	Region common-name
2022-08-26 17:18:54	60c5a8fffe74d46b	RAK	as923	AS923

<

1

>

10 / page

4. Connect the LoRa Device to ChirpStack

4.1 Configure ChirpStack

4.1.1 Add Application

- Fill in **your application name** to *Name

The screenshot displays the ChirpStack web interface. On the left is a sidebar menu with options: Network Server, Tenant (selected), Dashboard, Users, API keys, Device-profile templates, and Applications (highlighted in blue). The main content area shows the breadcrumb 'Tenants / ChirpStack / Applications / Add' and the title 'Add application'. The form contains a required field '* Name' with the value 'test', a 'Description' field with the value 'for test', and a blue 'Submit' button.

4.1.2 Add Device*

- Fill in **your device name** to Name*
- Fill in **your device's DevEUI** to Device EUI*
- Select **the device profiles you just created in Section 3.1.1** from Device-profile*

ChirpStack

Search...

?

admin

ChirpStack

Network Server

Dashboard

Tenants

Users

API keys

Device-profile templates

Tenant

Dashboard

Users

API keys

Device profiles

Gateways

Applications

Tenants / ChirpStack / Applications / TEST / Add device

Add device

Device Tags Variables

* Name

test-1

Description

* Device EUI (EUI64)

70b3d5a4d21000c9

MSB

C

* Device profile

AS923

Device is disabled ?

Disable frame-counter validation ?

Submit

- Fill in your **device's AppKey** to *Application key

ChirpStack

Tenants / ChirpStack / Applications / TEST / Devices / test-1

test-1 device eui: 70b3d5a4d21000c9

Delete device

Dashboard Configuration OTAA keys Activation Queue Events LoRaWAN frames

* Application key ?

e205520626d004e42e4ebc3bbd917ad

MSB

C

Submit

- The device was added to ChirpStack

ChirpStack

Search...

admin

Tenants / ChirpStack / Applications / TEST

TEST application id: c54eba2d-3115-4149-9a7b-1d0f5c152dca

Delete application

Devices Multicast groups Application configuration Integrations

Add device Selected devices

☐	Last seen	DevEUI	Name	Device profile	Battery
☐	Never	70b3d5a4d21000c9	test-1	AS923	

< 1 > 10 / page

4.2 Reboot the Device

- Reboot the device
- The device was connected to the ChirpStack successfully

ChirpStack

Search...

admin

ChirpStack

Network Server

Dashboard

Tenants

Users

API keys

Device-profile templates

Tenant

Dashboard

Users

API keys

Device profiles

Gateways

Applications

Dashboard Configuration OTAA keys Activation Queue Events LoRaWAN frames

2022-08-26 16:21:13 up DR: 2 Data: 215639033e00000000 FPort: 8

2022-08-26 16:21:13 log Code: UPLINK_CODEC Level: ERROR

2022-08-26 15:22:00 up DR: 2 Data: 720000000000fffaaffcadff6ff0ab FPort: 8

2022-08-26 15:22:00 log Code: UPLINK_CODEC Level: ERROR

2022-08-26 15:21:00 up DR: 2 Data: 720000000000fffaaffcafff6ff0ab FPort: 8

2022-08-26 15:21:00 log Code: UPLINK_CODEC Level: ERROR

2022-08-26 15:21:00 status Battery level: 0% Battery level unavailable: true External power source: false Margin: 8

2022-08-26 15:20:57 up DR: 2 Data: 1000a02a000c780523020504 FPort: 8

2022-08-26 15:20:57 log Code: UPLINK_CODEC Level: ERROR

2022-08-26 15:20:51 join DevAddr: 0033b549

End of the document